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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/058,708	01/28/2002	Kay Hellig	1458.TT4978	7368

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EXAMINER

LUHRS, MICHAEL K

ART UNIT	PAPER NUMBER
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2824

DATE MAILED: 03/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/058,708

Applicant(s)

HELLIG ET AL.

Examiner

Michael K. Luhrs

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-- **Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 14-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-18 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 6) <input checked="" type="checkbox"/> Other: <i>search history</i> . |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-13, and 18, drawn to method, classified in class 438, subclass 595.
 - II. Claims 14-17, drawn to apparatus, classified in class 257, subclass 408.
2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case that the product as claimed can be made by another and materially different process, e.g. by ion-mill etching.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Attorney Gustav Larsen on February 27, 2003 a provisional election was made with traverse to prosecute the invention of Group I, method claims 1-13 and 18. Affirmation of this election must be made by applicant in replying to this Office action.
5. Claims 14-17 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Information Disclosure Statement

6. The information disclosure statement filed 12-24-02 has not been considered because the applications have not been published.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-13 and 18 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Etching of the dielectric spacer layer, prior to forming a layer subsequent to the dielectric layer is not enabled by the disclosure. In reviewing, Fig. 4, layer 22, (the dielectric layer) is not etched prior to forming the subsequent layer namely layer 24. In fact, layer 22 is etched after the formation of the subsequent layer 24/25 as shown in Fig. 6 as it becomes layer 27. In Fig. 6 layer 27 has been etched yet the subsequent layer 25, is already formed.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 7 - 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 7,...antecedent for the 'dielectric layer' points to applicant's layer '27' in Fig. 6, and since claim 1 has the etching of the dielectric spacer layer prior to forming another layer, *subsequent* to the dielectric layer, then that means the dielectric layer to

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which claim 7 is referring, is layer 27 in Fig. 6. Therefore, since layer 27 does not show any variable thickness vertically or horizontally, claim 7 is assertively, erroneously, confusing the L-shaped spacer with the variable profile layer. Regarding claim 8, an L-shaped spacer, as shown in applicant's Fig. 6 as layer "27", does not show any bulging profile, rather the bulging profile appears in layer "25" - that is not an L-shaped spacer at all. It is suggested, that when referring to the L-shaped spacer "27", the applicant not include any description regarding the appearance of layer "25". It is thus, necessary that layer 25 be described in the method steps to form its variable profile, since corrective action to the description to the dielectric layer 27, will necessitate explanation of the formation of layer 25 profile. See below:

11. Claims 1-13 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: The description of formation of "a layer" in line 5 of claim 1. There is no definitive steps outlining the formation of "a layer", yet the layer formed subsequent to the dielectric layer has the variable profile as described in claim 8 yet there is no connection between the "layer" in claim 1 to the profile description in claim 8, is assertively necessitating a correlation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-6 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Beckx et. al. USPN 6,096,657. Regarding claims 1 and 18, Beckx et. al. teach substrate 1, (line 7, column 4), liner 4, (line 20, column 4), dielectric 5 (line 21 column 4), and a layer subsequent, as layer 6 (line 40, column 4). High anisotropical etch is described in line 66-67 column 5. Regarding claim 2, liner oxide 4, is formed over a gate structure 2 as shown in any of the various Figures. Regarding claim 3, oxide layer 4, is 50 nm (line 21 column 4) is not between 20 Angstroms and 200 Angstroms, yet the invention is not limited to thickness as discussed in line 13, column 4. Regarding claims 4 and 5, the dielectric is nitride, (line 20, column 4) and is 20 nm (line 22, column 4) in thickness that falls within 150 Angstroms and 500 Angstroms. Regarding claim 6, Beckx et. al. teach a nitride layer for the dielectric spacer layer—a nitride layer can be a *silicon oxynitride* layer since a nitride layer would include a layer comprised of silicon oxynitride which includes nitride.

13. Claims 7-10 have not been treated on the merits since the L-shaped spacers shown by the applicant do not show varying thickness.

Regarding claims 9 and 10 (that are dependent on claim 7 that has a 35 U.S.C. 112, first and second paragraph issue) the following is offered, carbon-fluorine based chemistry may be used (line 3, column 6). Carbon-fluorine based chemistry would include CF₃F, since CH₃F includes carbon and fluorine.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:


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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckx et. al. as applied to claim 1 above, and further in view of Gupta et. al. (USPN 6,391,732). Beckx et. al. is silent regarding O₂. While Gupta et. al. teach etch chemistry CH₃F with O₂ in combination (lines 37-44, column 4) and Argon inert for the purpose of etching that inhibits lateral etching (line 50-51 column 4). Since Gupta et. al. teach *any* combination, the particular ratios of the claim, temperatures and pressures are included within Gupta et. al.. Since Gupta et. al. and Beckx et. al. are all from the same field of endeavor, the purpose disclosed by Gupta et. al. would have been recognized in the pertinent art of Beckx et. al. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to etch using CHF₃ and O₂ and Ar for the purpose of inhibiting lateral undercut of the layer with the motivation of forming a new L-shape (from layer 74 to layer 64, lines 52-53 column 4) as Gupta et. al. teaches is alternative method to provide a spacer having the benefit of being filled later on without gapping (see lines 54-55 column 1) should thus include such etch chemistry in the event one is targetting the particular profile that Gupta et. al. intends to provide.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Badenes et. al., USPN 6,380,039, also anticipates the claimed inventive method. Kempa et. al. (USPN 6,376,262) teaches endpoint detection for anisotropic etching. In DeOrnellas, USPN 6,492,280, etch chemistry is provided in column 6 for metals and dielectrics.
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael K. Luhrs whose telephone number is 703-305-2864. The examiner can normally be reached on M-F; 8:00 a.m. - 5:00 p.m.. (other Fri. off)
17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard T. Elms can be reached on 703-308-2816.
18. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.
19. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Michael K. Luhrs
February 27, 2003


MICHAEL S. LEBENTRITT
PRIMARY EXAMINER